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SUMMARY-FIRST EIGHT YEARS OF CONE SAMPLING FOR SEED AND CONE INSECT DAMAGE IN THE LAKE STATES RED PINE SEED PRODUCTION AREAS 1962-1969

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ABSTRACT

Damage to red pine seeds and cones is caused by five insects: Conophthorus resinosae Hopk., Dioryctria disclusa Heinrich, Eucosma monitorana Heinrich, Laspeyresia toreuta Grote, and Rubsaamenia sp. The damage has varied from few cones destroyed to the loss of the entire cone crop.

Cones and conelets from one mid-crown branch whorl from each of 15 trees in a seed production area were removed. The cones were grouped by species of insect that caused damage. Conelets were sorted as sound or insect damaged.

The cone crops fluctuated considerably but the frequency of insect damage increased steadily provided ample host food was available. The ideal condition to keep the insect population low and harvest damage free cones is to have each good cone crop followed by a poor crop.

Prediction of final cone crops based on conelet counts is not possible with the data collected to date.

INTRODUCTION

Sampling of cones for insect damage was begun in 1962 in the Lake States red pine, Pinus resinosa Ait., seed production areas.

The damage caused by five insects is recognized. Three, the red pine cone beetle, Conophthorus resinosae Hopk., and two cone worms, Dioryctria disclusa Heinrich and Eucosma monitorana Heinrich, kill the cone before seeds mature. Laspeyresia toreuta Grote and Rubsaamenia sp. cause partial cone damage or kill some seeds thus reducing the yield.

The damage to cone crops by these insects has been variable from light to total destruction of the crop. The history of damage in all seed production areas is difficult to trace because of inconsistency in annual selections of areas to be sampled. However, eight areas (Table 1) have been sampled consistently since 1964 or 1965 to 1968 or 1969 and these data are discussed in more detail.

Table 1.--Summarized Red Pine Seed Production Areas.

Seed Production Area	National Forest	Ranger District	County	State
Birch Hill	Chippewa	Cass Lake	Itasca	Minn.
Portage Lake	Chippewa	Bena	Cass	Minn.
Bearsdale Springs	Chequamegon	Washburn	Bayfield	Wisc.
Farr Lake	Nicolet	Lakewood	Oconto	Wisc.
Carey Dam	Nicolet	Three Lakes	Forest	Wisc.
Norway Lake	Ottawa	Kenton	Houghton	Mich.
Ogontz River	Hiawatha	Rapid River	Delta	Mich.
Black Creek	Hiawatha	Sault Ste. Marie	Chippewa	Mich.

The sampling procedures were developed by the North Central Forest Experiment Station (NCFES) staff. The collections were made by National Forest personnel. The NCFES staff classified the cone damage according to causal insect. The classification work was taken over in 1968 by Forest Pest Control division of State and Private Forestry.

METHODS

The sample cones and conelets were collected in late July or early August from all branches of a mid-crown whorl from each of 15 trees in each SPA to be sampled. The cones were classified by insect damage. Conelets were classified as sound or damaged.

DISCUSSION

Annual observations of cone crops and cone damage in 8 seed production areas (Figure 1) provides us with the following conclusions and trend indications:

1.--Cone crops vary from year to year and from one area to another the same year.

2.--Insect damage of cones varies from year to year and from one area to another the same year.

3.--The number of damaged cones increases from one year to the next as long as the cone crop is large enough to support the population increase.

4.--A large cone crop following a poor crop is relatively undamaged.

These observations support those of Mattson (in Press). The latter has made a more detailed analysis of the data for the same areas for the years 1964 through 1967. Our observations are based on 2 additional years of collection (1968-1969).

The forest manager should note that the cone crop was low, i.e. less than 40 cones per mid-crown whorl which means less than ½ bushel per tree (a mid-crown whorl contains approximately 5% of the cones on the tree), in the majority of seed production areas in most years. Considering each year in each seed production area as a SPA year then only 6 of the 42 possible cone crops exceed ½ bushel of cones per tree. However, when insect damaged cones are removed from crop estimates, only once (Carey Dam, 1967) was an acceptable cone crop produced.

We recommend that insect damage impact be determined in areas the managers plan to collect or purchase cones.

REFERENCE

Mattson, W. J., Jr. Relationship between cone crop size and cone damage by insects in red pine seed-production areas. (In Press).

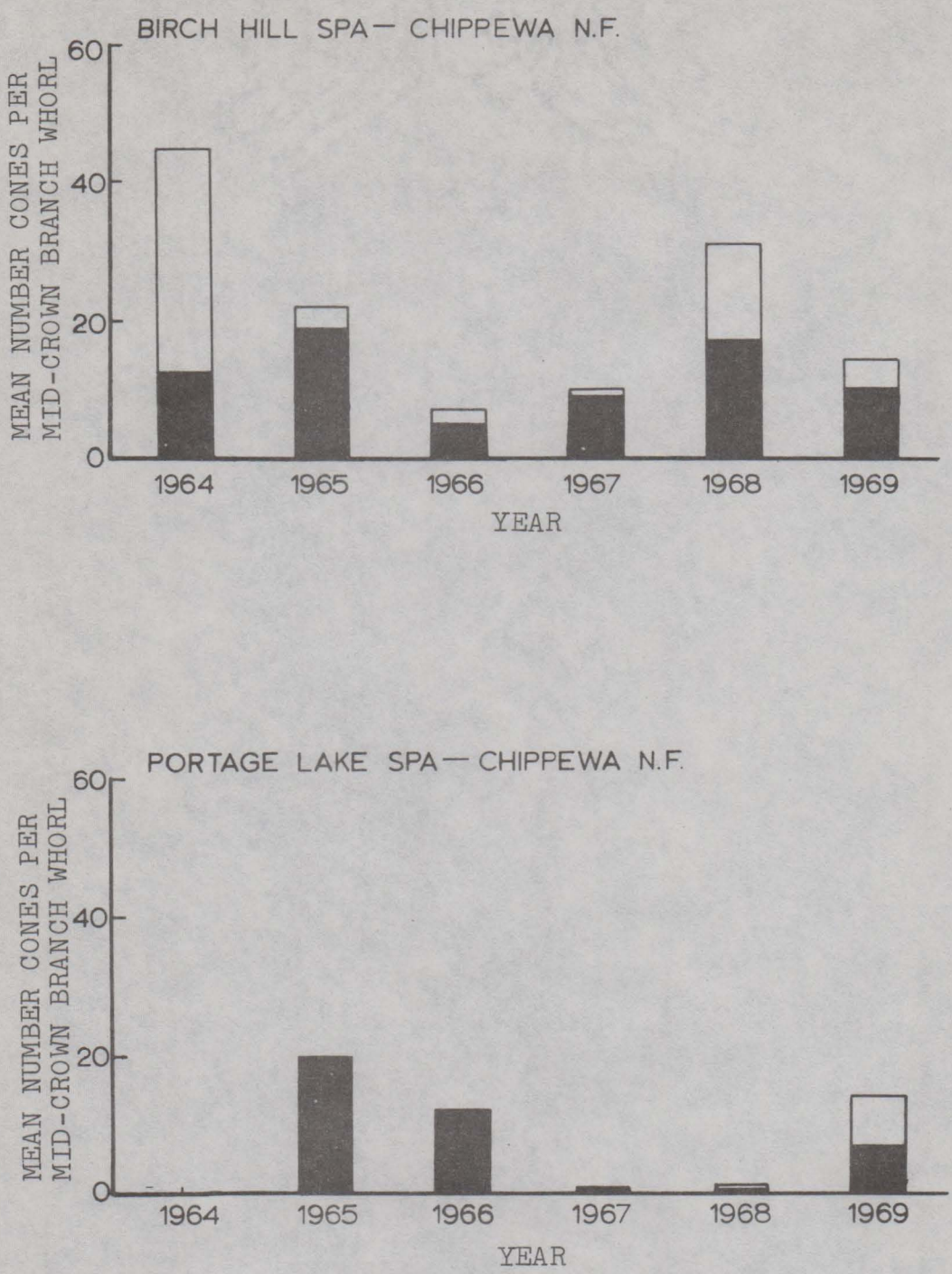
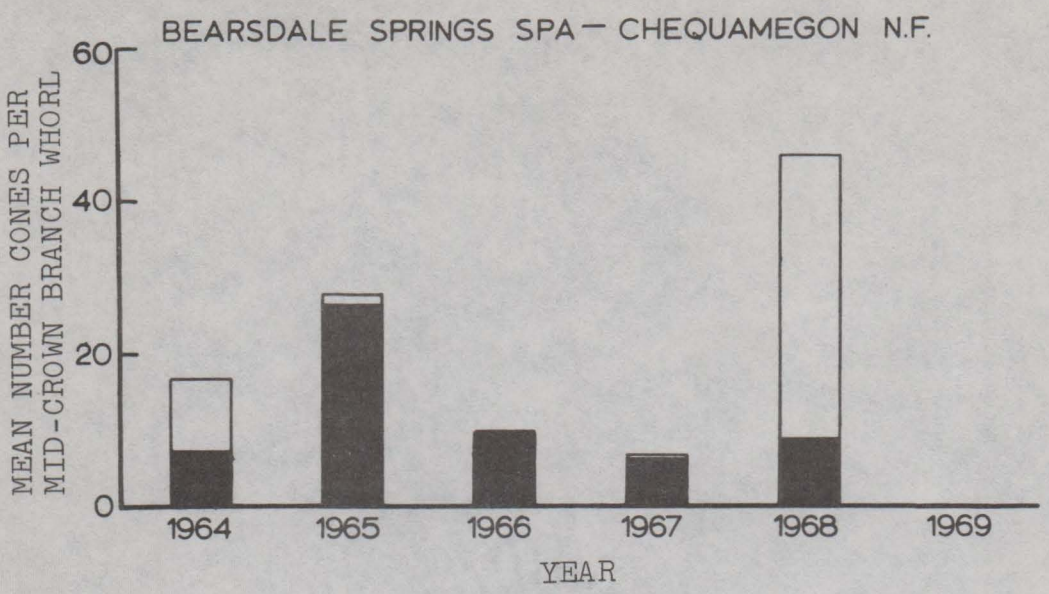


Figure 1.--Cone Crop Size (Unshaded) and Insect Damaged Cones (Shaded) by Years at Eight Seed-Production Areas.



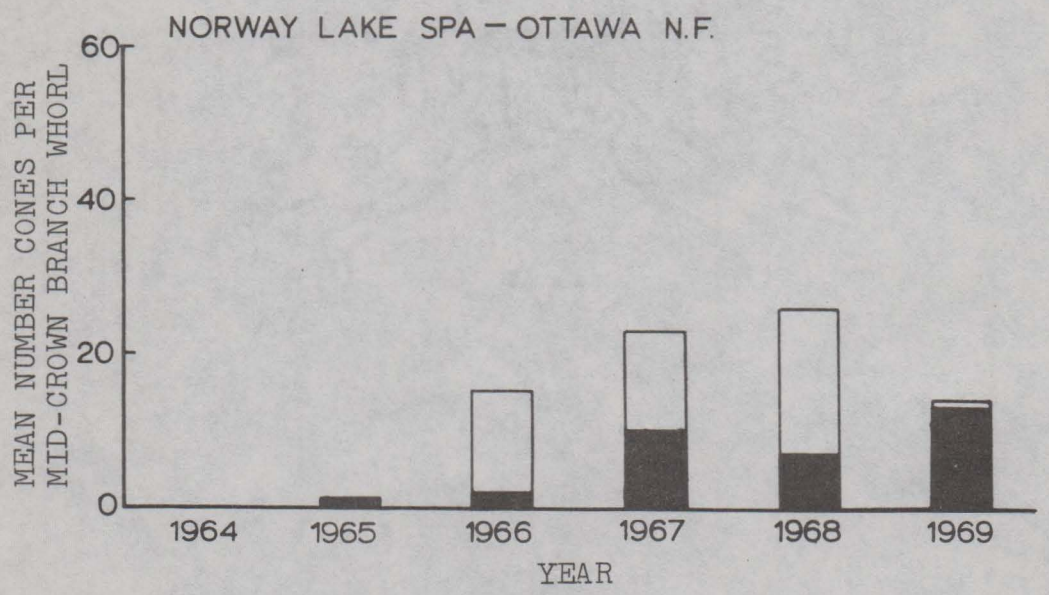
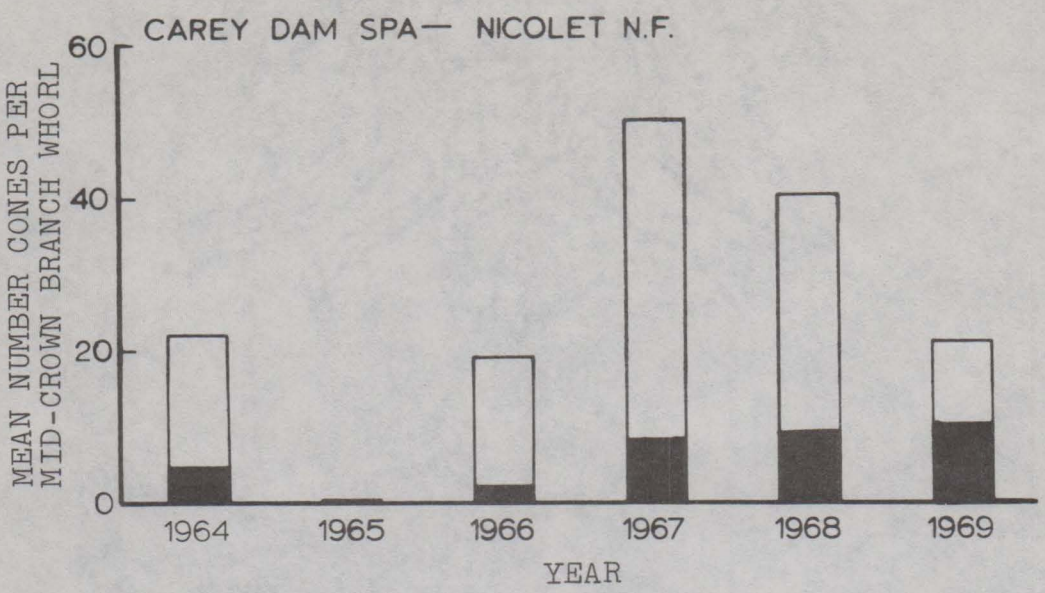


Figure 1.--Continued



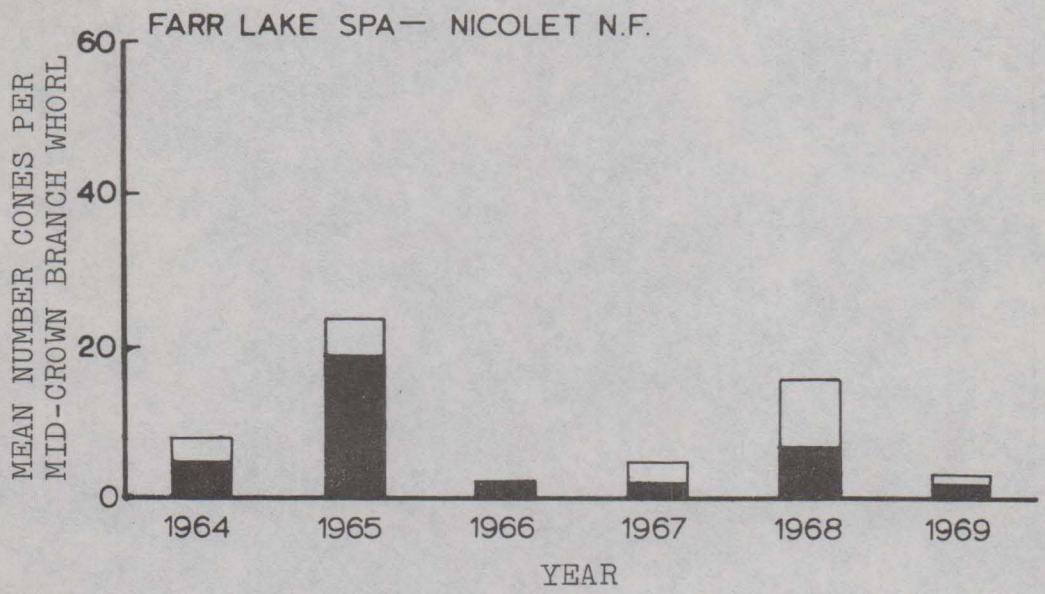
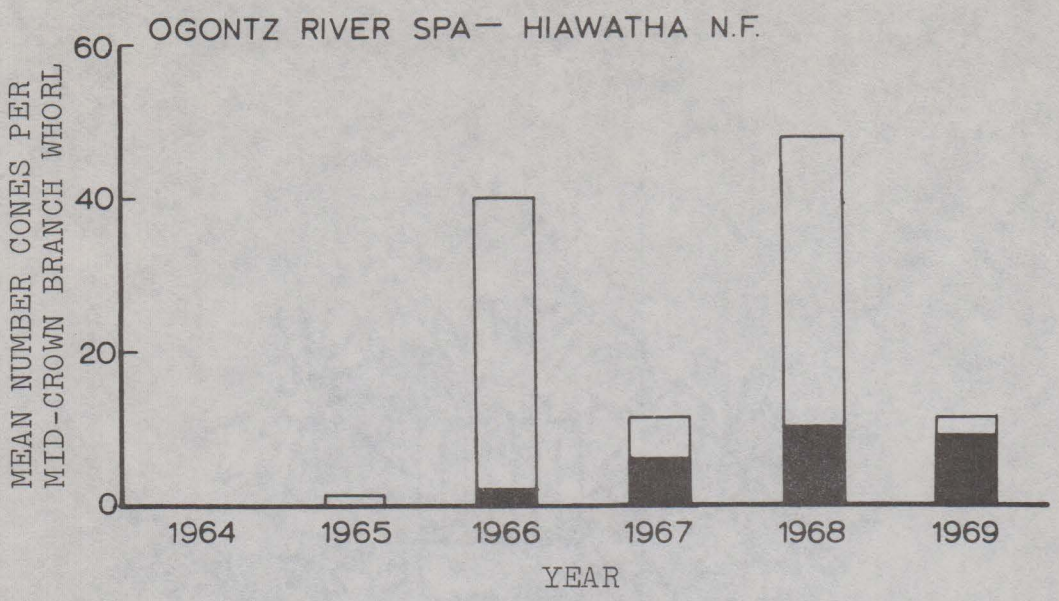


Figure 1.--Continued



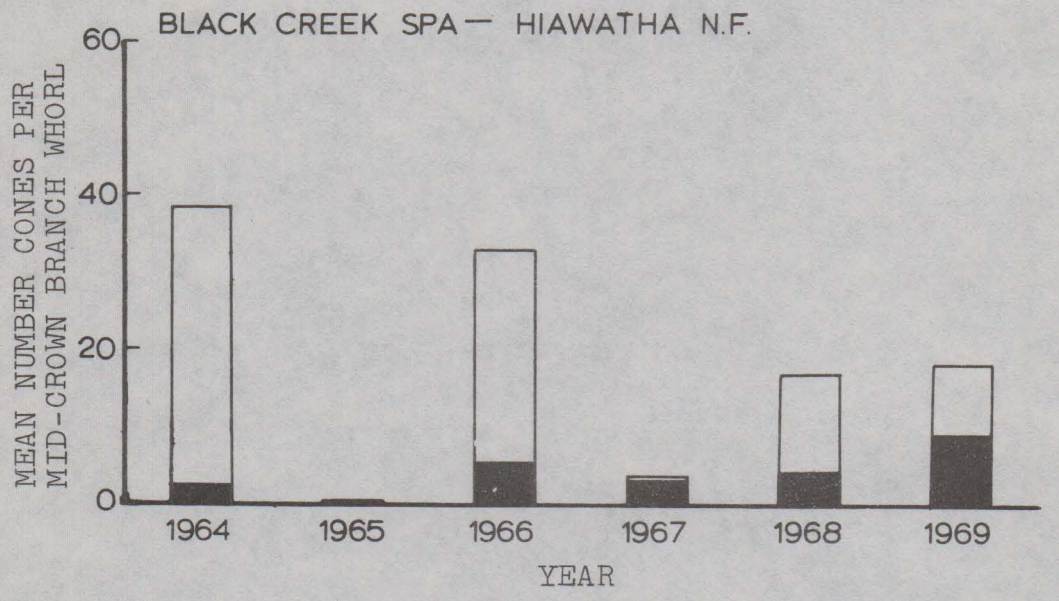


Figure 1.--Continued